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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/706,475	11/03/2000	Alexei N. Pilipetskii	1006	6892

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EXAMINER	
LI, SHI K	

ART UNIT	PAPER NUMBER
2633	9

DATE MAILED: 06/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/706,475	Applicant(s) PILIPETSKII ET AL.	
	Examiner Shi K. Li	Art Unit 2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-9 and 11-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9 and 11-15* is/are allowed.

6)☒ Claim(s) *1 and 3-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 3, 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mukasa (U.S. Patent 6,084,993) in view of Tanaka et al. (U.S. Patent 6,681,082 B1).

Regarding claim 1, Mukasa discloses in FIG. 1 a transmission system comprising transmission station 2, receiving station 3, repeaters EDFA and link span 1. Link span 1 consists of three fiber segments F1, F2 and F3. Mukasa teaches in Table 1 that F1 has positive dispersion and positive dispersion slope, F3 has negative dispersion and negative dispersion slope and F2 has negative dispersion and positive dispersion slope. Link span 1 includes first segment F1 and second segment F3. The dash line in FIG. 1 suggests that there are more EDFAs and link span 1 is duplicated between adjacent EDFAs. In case such suggestion is not convincing, Tanaka et al. teaches in FIG. 1 to have a plurality of link spans so that the transmission station and the receiving station can be separated by a long distance, e.g., in trans-ocean applications. One of ordinary skill in the art would have been motivated to combine the teaching of Tanaka et al. with the transmission system of Mukasa because multiple link spans allows the system to be used in long distance transmission applications. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a plurality of link spans between transmission station and receiving station, as taught by Tanaka et al., in the transmission system of Mukasa because multiple link spans allows the system to be used in long distance transmission applications.

Regarding claims 3 and 8, the modified transmission system of Mukasa and Tanaka et al. includes a second link span and a third link span, each of them have a same structure as link span 1 of FIG. 1 of Mukasa with F1 of first fiber type, F3 of second fiber type and F2 of third fiber type.

Regarding claim 5, the modified transmission system of Mukasa and Tanaka et al. includes first, second, third and fourth optical repeaters. The first link span is between the first optical repeater and the second optical repeater, the second link span is between the second optical repeater and the third repeater, the third link span is between the third optical repeater and the fourth optical repeater.

3. Claims 1 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (T. Li, "The Impact of Optical Amplifiers on Long-Distance Lightwave Telecommunications", Proceedings of the IEEE, Vol. 81, No. 11, November 1993) in view of Tirloni et al. (U.S. Patent Application Pub. 2004/0028359 A1).

Li teaches in FIG. 9 a long-distance transmission system with a plurality of link spans. The difference between Li and the claimed invention is that Li does not teach to use fiber segments of various dispersion and dispersion slope to compensate for dispersion. Tirloni et al. teaches in FIG. 1 to use two fiber segments A and B to compensate for non-linear effect. Tirloni et al. discloses in Table 1 and Table 2 various choices of fiber types for segments A and B. In particular, Tirloni et al. teaches A1 of positive dispersion and positive dispersion slope, B1 of negative dispersion and negative dispersion slope, A5 of negative dispersion and positive dispersion slope. Tirloni et al. further give in Table 3, second row an example of a first link span of A1-B1. One of ordinary skill in the art would have been motivated to combine the teaching of

Tirloni et al. with the transmission system of Li because the combined fiber link span reduces accumulative dispersion and improve signal quality. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a combined-segment fiber link spans, as taught by Tirloni et al., in the transmission system of Li because the combined fiber link span reduces accumulative dispersion and improve signal quality.

Regarding claim 4, Tirloni et al. teaches in Table 3, second row an example of a first link span of A1-B1, which have a combined zero dispersion and combined zero dispersion slope, i.e., A1 and B1 have dispersion and dispersion slope equal in magnitude and opposite in sign.

Regarding claim 5, Li includes amplifiers (optical repeaters) in FIG. 9. The first link span is between the first optical repeater and the second optical repeater, the second link span is between the second optical repeater and the third repeater, the third link span is between the third optical repeater and the fourth optical repeater.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mukasa and Tanaka et al. as applied to claims 1, 3, 5 and 8 above, and further in view of Tanaka et al. (6,594,428 B1).

Mukasa and Tanaka et al. have been discussed above in regard to claims 1, 3, 5 and 8. The difference between Mukasa and Tanaka et al. and the claimed invention is that Mukasa and Tanaka et al. do not teach to maintain the end-to-end dispersion for each wavelength from a plurality of wavelengths to be substantially equal. Patent '428 teaches in FIG. 5 to compensate dispersion so that at the end of each link span dispersion is essentially the same for each wavelength and as a result, the end-to-end dispersion is essentially the same for each wavelength. One of ordinary skill in the art would have been motivated to combine the teaching of patent '428

with the modified transmission system of Mukasa and Tanaka et al. because otherwise signals of different wavelength will not arrive at the same time and loss synchronization in the repeater. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to keep end-to-end dispersion for each wavelength to be substantially the same, as taught by Patent '428, in the modified transmission system of Mukasa and Tanaka et al. because this ensures signals of different wavelength arrive at the receiver at the same time so that they are in synchronization.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li and Tirloni et al. as applied to claims 1 and 4-5 above, and further in view of Tanaka et al. (U.S. Patent 6,594,428 B1).

Li and Tirloni et al. have been discussed above in regard to claims 1 and 4-5. The difference between Li and Tirloni et al. and the claimed invention is that Li and Tirloni et al. do not teach to have a local average dispersion with a magnitude substantially greater than zero for the first and second link span. Tanaka et al. teaches in col. 2, lines 19-23 and FIG. 1 (B) that due to nonlinear effects it is desirable to set dispersion low other than zero at the end of each span and compensate to near zero after several span to limit the accumulative dispersion so that it does not create interference between adjacent bits. Tanaka et al. gives an example such that the dispersion is restored to near zero every six (6) spans. It is obvious to one of ordinary skill in the art that restoration can be done in any reasonable number of spans, such as 3, as long as the accumulative dispersion has not exceeded a limit. One of ordinary skill in the art would have been motivated to combine the teaching of Tanaka et al. with the modified transmission system of Li and Tirloni et al. because the approach minimizes nonlinear effects and improves signal

quality. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to maintain a non-zero dispersion at the first and second span and restore the dispersion to near zero at the third span, as taught by Tanaka et al., in the modified transmission system of Li and Tirloni et al. because the approach minimizes nonlinear effects and improves signal quality.

Allowable Subject Matter

6. Claims 9, 11-15 are allowed.

Response to Arguments

7. Applicant's arguments with respect to claims 1, 3-8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 703 305-4341. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703 305-4729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

skl

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